CLAIMS

1. A method for fabrication of a locomotive diesel engine turbocharger turbine stage, comprising the steps of:

selecting throttle settings for the engine;

modeling a turbocharger for the engine, including modeling of a turbine stage thereof, said modeling of the turbine stage further comprising modeling of turbine blades of a turbine wheel and modeling turbine nozzle vanes, wherein the selected throttle settings correlate to discrete rotation speeds of the turbocharger;

determining at least one natural vibration frequency of the turbine blades;

determining a turbine nozzle vane excitation frequency as a function of turbocharger rotation speed; and

ascertaining whether at least one data coincidence is present, said ascertaining comprising determining whether, at a rotation speed of a throttle setting, there is a data coincidence of said at least one natural frequency and said turbine vane nozzle excitation;

wherein if there is an absence of any said data coincidence, a turbine stage fabricated according to said modeling will have turbine blades which are at least substantially free of harmonically resonant vibration at the discrete rotation speeds of the turbocharger.

2. The method of Claim 1, wherein a data coincidence of said at least one data coincidence comprises a predetermined range of proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation.

3. The method of Claim 2, further comprising fabricating the turbocharger according to said step of modeling, wherein said step of modeling is free of any said data coincidence.

4. A turbocharger fabricated according to the method of Claim 3.

5. The method of Claim 2, further comprising repeating the step of modeling, the first and second steps of determining, and the step of ascertaining until the absence of any data coincidence is obtained;

wherein the repeating of said step of modeling comprises at least one of remodeling the turbine blades and remodeling the turbine nozzle vanes.

6. The method of Claim 5, wherein the remodeling of the turbine blades comprises remodeling at least one of configuration and material composition of the turbine blades.

7. The method of Claim 6, further comprising fabricating a turbocharger according to the repeating of said step of modeling.

8. A turbocharger fabricated according to the method of Claim 7.

9. The method of Claim 5, wherein said step of modeling provides a number of said turbine nozzle vanes; further wherein the remodeling of the turbine nozzle vanes comprises changing the number of said turbine nozzle vanes.

10. The method of Claim 9, wherein the remodeling of the turbine nozzle vanes provides an odd, prime number of turbine nozzle vanes.

11. The method of Claim 10, further comprising fabricating a turbocharger according to the repeating of said step of modeling.

12. A turbocharger fabricated according to the method of Claim 11.

13. The method of Claim 1, further comprising repeating said step of selecting the throttle settings, wherein at least one new throttle setting is selected, and wherein there is an absence of any said data coincidence.

14. The method of Claim 13, wherein a data coincidence of said at least one data coincidence comprises a predetermined range of proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation.

15. The method of Claim 14, further comprising fabricating a turbocharger according to the repeating of said step of modeling.

16. A turbocharger fabricated according to the method of Claim 15.

17. A method for fabrication of a locomotive diesel engine turbocharger turbine stage, comprising the steps of:

selecting throttle settings for the engine;

modeling a turbocharger for the engine, including modeling of a turbine stage thereof, said modeling of the turbine stage further comprising modeling of turbine blades of a turbine wheel and modeling turbine nozzle vanes, wherein the selected throttle settings correlate to discrete rotation speeds of the turbocharger;

determining at least one natural vibration frequency of the turbine blades;

determining a turbine nozzle vane excitation frequency as a function of turbocharger rotation speed;

ascertaining whether at least one data coincidence is present, said ascertaining comprising determining whether, at a rotation speed of a throttle setting, there is a data coincidence of said at least one natural frequency and said turbine vane nozzle excitation, wherein a data coincidence of said at least one data coincidence comprises a predetermined range of proximity of each of said rotation speed of a throttle setting, said at least one natural frequency, and said turbine vane nozzle excitation; and

repeating the step of modeling, the first and second steps of determining, and the step of ascertaining until the absence of any data coincidence is obtained, wherein the repeating of said step of modeling comprises at least one of remodeling the turbine blades and remodeling the turbine nozzle vanes;

wherein if there is an absence of any said data coincidence, a turbine stage fabricated according to said modeling will have turbine blades which are at least substantially free of harmonically resonant vibration at the discrete rotation speeds of the turbocharger.

18. The method of Claim 17, further comprising fabricating the turbocharger according to said step of modeling, wherein said step of modeling is free of any said data coincidence.

19. The method of Claim 17, further comprising repeating said step of selecting the throttle settings, wherein at least one new throttle setting is selected, and wherein there remains the absence of any said data coincidence.

20. The method of Claim 19, further comprising fabricating the turbocharger according to said step of modeling, wherein said step of modeling is free of any said data coincidence.